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BLAKELY SOKOLOFF TAYLOR & ZAFMAN
12400 WILSHIRE BOULEVARD
SEVENTH FLOOR
LOS ANGELES, CA 90025-1030

EXAMINER

CHANNAVAJJALA, SRIRAMA T

ART UNIT PAPER NUMBER

2166

DATE MAILED: 10/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/810,164

Applicant(s)

WU ET AL.

Examiner

Srirama Channavajjala

Art Unit

2166

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>3/6/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-30 are presented for examination.

Drawings

2. The Drawings filed on 3/26/2004 are acceptable for examination purpose; however, drawings are objected to because fig 1A-1B should be labeled as "Prior Art" [see spec page 2, 0003-0004].

Information Disclosure Statement

3. The information disclosure statement filed on 3/26/2004 is in compliance with the provisions of 37 CFR 1.97, and has been considered and a copy is enclosed with this Office Action.

Specification

4. The specification is objected to because "**Brief summary of the invention**" is missing. (See MPEP § 608.01(d)), although "Description of related Art [page 2] may be treated as " Background of the invention. (See MPEP § 608.01(c)).

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. *Claims 1-30 are rejected under 35 U.S.C. 101 because invention is directed to non-statutory subject matter.*

As set forth in MPEP 2106(II)A:

Identify and understand Any Practical Application Asserted for the Invention

The claimed invention as a whole must accomplish a practical application. That is, it must produce a "useful, concrete and tangible result." State Street, 149 F.3d at 1373, 47USPQ2d at 1601-02. The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a starting point for future investigation or research (Brenner v. Manson, 383 U.S. 519, 528-36, 148 USPQ 689, 693-96); In re Ziegler, 992, F.2d 1197, 1200-03, 26 USPQ2d 1600, 1603-06 (Fed. Cir. 1993)). Accordingly, a complete disclosure should contain some indication of the practical application for the claimed invention, i.e., why the applicant believes the claimed invention is useful.

Apart from the utility requirement of 35 U.S.C. 101, usefulness under the patent eligibility standard requires significant functionality to be present to satisfy the useful result aspect of the practical application requirement. See Arrhythmia, 958 F.2d at 1057, 22 USPQ2d at 1036. Merely claiming nonfunctional descriptive material stored in a computer-readable medium does

not make the invention eligible for patenting. For example, a claim directed to a word processing file stored on a disk may satisfy the utility requirement of 35 U.S.C. 101 since the information stored may have some “real world” value. However, the mere fact that the claim may satisfy the utility requirement of 35 U.S.C. 101 does not mean that a useful result is achieved under the practical application requirement. The claimed invention as a whole must produce a “**useful, concrete and tangible**” result to have a practical application.

6. Regarding claim 1, 14, 17,20 “A method, comprising:
allocating a space to accommodate a mark bit and an allocation bit;
integrating the mark bit and the allocation bit into a mark/allocation bit using the space;
and corresponding the mark/allocation bit with an object in a heap”, is directed to “abstract idea” because all of the elements in the claim 1 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 9, 0022 through page 13, 0031 as software, such that the method is software, per se, is “non-statutory subject matter” and **claim 1** do not have “practical application” because the “final result” by the claimed invention in the claim 1,14, 17,20, elements particularly “***integrating the mark bit and the allocation bit into a mark/allocation bit using the space; and corresponding the mark/allocation bit with an object in a heap***” is merely software routines or steps or algorithm related to data structure, but do not specify that the result neither stored, displayed nor output to a user. Therefore, claim 1, 14, is a non-statutory subject matter.

The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention must produce a ***“useful, concrete and tangible result.”*** The **Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility** states in section IV C. 2 b. (2) (on page 21 in the PDF format):

The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had “no substantial practical application.”).

[If] Claims 1,14, 17,20 have the result of producing “real-world” results related to ***“integrating the mark bit and the allocation bit into a mark/allocation bit using the space; and corresponding the mark/allocation bit with an object in a heap”*** but do not specify that the result either output, displayed or at least stored to a user or otherwise used in the real world.

The examiner reviewed the specification page 9, 0022 through page 13, 0031, but unable to find a practical real-world use of the result (***“integrating the mark bit and the allocation bit into a mark/allocation bit using the space; and corresponding the mark/allocation bit with an object in a heap”***). If the applicant is able to find one

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and inserts it into the claims provide the location the element is found in the specification.

Claims 2-8, 15-16, 18-19, 21-26 depend from claim 1, 14, 17, 20, is also rejected in the analysis of above.

7. Regarding claim 9, 27, "A method, comprising:
dividing a heap into a plurality of segments;
using a mark/allocation bit as an allocation bit to locate a segment of the plurality of segments, the segment having a live object; and
generating allocation bits for the located segment" is directed to "abstract idea" because all of the elements in the claim 9 would reasonably be interpreted by one of ordinary skill in light of the disclosure at page 9, 0022 through page 13, 0031, page 15, 0036- page 18, 0044 as software, such that the method is software, per se, is "non-statutory subject matter" and **claim 9** do not have "practical application" because the "final result" by the claimed invention in the claim 9, 27, elements particularly "**using a mark/allocation bit as an allocation bit to locate a segment of the plurality of segments, the segment having a live object; and generating allocation bits for the located segment**" is merely software routines or steps or algorithm related to data structure, but do not specify that the result neither stored, displayed nor output to a user. Therefore, claim 9, 27, is a non-statutory subject matter.

The claimed invention is subject to the test of State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-02. Specifically State Street sets forth that the claimed invention must produce a ***“useful, concrete and tangible result.”*** The **Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility** states in section IV C. 2 b. (2) (on page 21 in the PDF format):

The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a § 101 judicial exception, in that the process claim must set forth a practical application of that § 101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had “no substantial practical application.”).

[If] Claims 9,27, have the result of producing “real-world” results related to ***“using a mark/allocation bit as an allocation bit to locate a segment of the plurality of segments, the segment having a live object; and generating allocation bits for the located segment”***” but do not specify that the result either output, displayed or at least stored to a user or otherwise used in the real world.

The examiner reviewed the specification page 9, 0022 through page 13, 0031, but unable to find a practical real-world use of the result (***“using a mark/allocation bit as an allocation bit to locate a segment of the plurality of segments, the segment having a live object; and generating allocation bits for the located segment”***). If the applicant is able to find one and inserts it into the claims provide the location the element is found in the specification.

Claims 10-13,28-30 depend from claim 9,27 is also rejected in the analysis of above.

8. Regarding claim 17,20,27, In accordance with at least one of the embodiment of the claimed storage medium [claim 17], machine-readable medium [claims 20-30] as described in the specification at page 8, 0021, page 9, line 1-8, particularly, page 9, line 7 **"data signals embodied in a carrier wave or other propagation medium.."** Further, in accordance with **"Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility"**, published on 10/26/2005, **signals, that carry functional descriptive material such** as **"An article of manufacture** , [machine-readable medium, or computer-readable medium] comprising a computer program **carrier readable** by a computer and embodying one or more instructions executable by the computer to perform.....**"does not fall"** within one of the **four statutory classes** of 35 U.S.C § 101, [see page 55-57, **"Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility"**] and thus **ineligible for patent protection..**

9. As to claim 1,9,14,17,, preamble reads "merely directed to "A method, A system", "An apparatus,..",but fail to include a **general description in the preamble"**

Remarks:

Examiner suggests that the applicant consider amending claims 1,9,14,17, preamble to include general description. See MPEP 608.01 Claims: any claim should contain the following order: (a) a preamble comprising a general description of all the elements of steps of the claimed combination which are convention or known.....

For "General Analysis for Determining Patent-Eligible Subject Matter", see 101 Interim Guidelines as indicated below:

<<<http://www.uspto.gov/web/offices/pac/dapp/ogsheet.html>>>

No new matter should be entered

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. *Claims 1-6,14-25, are rejected under 35 U.S.C. 102(b) as being anticipated by Raymond, US Patent No. 6324631, published on Nov 27, 2001.*

12. As to claim 1,14,17,20, Kuiper teaches a system which including 'allocating a space to accommodate a mark bit and an allocation bit' [col 5, line 59-65, line 66-67, col 6, line 1-6, fig 2], Kuiper teaches mark bit array data structure, particularly mark bit allocations for example mark bits 6,8-9,12-13,16-19,21-23,25,30-32 corresponds to memory regions is equivalent to allocating a space for mark bit; 'integrating the mark bit and the allocation bit into a mark/allocation bit using the space[col 6, line 7-18, col 6, line 29-33], Kuiper teaches a threshold value is set to determine memory space particularly, for free space regions and inspecting groups of bit related to free space regions and accordingly mark bit sequence is applied as detailed in col 6, line 7-18, line 29-33; and corresponding the mark/allocation bit with an object in a heap [col 9, line 1-7].

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13. As to claim 2, 21, Kuiper disclosed 'resetting the mark/allocation bit [col 2, line 9-10, col 8, line 7-18]; and switching the mark/allocation bit to the allocation bit to perform root set enumeration' [col 1, line 52-56, line 62-67, col 2, line 1-2].

14. As to claim 3, 22, Kuiper disclosed ' performing the root set enumeration by utilizing the mark/allocation bit as the allocation bit to conduct pointer identification of the object in the heap' [col 1, line 52-61, col 3, line 20-29].

15. As to claim 4, 23, Kuiper disclosed 'resetting the mark/allocation bit col 2, line 9-10, col 8, line 7-18]; and switching the mark/allocation bit to the mark bit to perform marking and scanning of objects using the identified object [col 1, line 52-56, line 62-67, col 2, line 1-2, line 9-22].

16. As to claim 5, 24, Kuiper disclosed 'marking the identified object as a root object [col 1, line 55-56]; scanning one or more objects associated with the root object by utilizing the mark/allocation bit as the mark bit' [col 1, line 62-65]; and marking the scanned one or more objects associated with the root object' [col 7, line 1-8].

17. As to claim 6, 25, Kuiper disclosed 'retaining the marked root object and the marked one or more objects associated with the root object; and regenerating allocation bits for the retained objects' [col 6, line 37-42].

18. As to claim 15, Kuiper disclosed 'a resetting routine to reset the mark/allocation bit [col 2, line 9-10, col 8, line 7-18]; a switching module to switch the mark/allocation bit to the allocation bit to perform root set enumeration [col 1, line 52-56, line 62-67, col 2, line 1-2].; and a root set enumeration module to perform the root set enumeration by utilizing the mark/allocation bit as the allocation bit to conduct pointer identification of the object in the heap'[col 1, line 52-61, col 3, line 20-29]..

19. As to claim 16, Kuiper disclosed 'the resetting routine to reset the mark/allocation bit col 2, line 9-10, col 8, line 7-18] ; the switching module to switch the mark/allocation bit to the mark bit to perform marking and scanning using the identified object[col 1, line 52-56, line 62-67, col 2, line 1-2, line 9-22]; and a mark/scan unit to mark the identified object as a root object[col 1, line 55-56]; ' scan one or more objects associated with the root object by utilizing the mark/allocation bit as the mark bit [col 1, line 62-65], and mark the scanned one or more objects associated with the root object [col 7, line 1-8].

20. *Claims 9-11,27-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Kolodner et al. [hereafter Kolodner], US Pub No. 2002/0055941 published on May 9,2002.*

21. As to claim 9,27, Kolodner teaches a system which including 'dividing a heap into a plurality of segments' [page 1, col 2, 0012]; Kolodner specifically teaches "heap is divided or partitioned into number of segments or units for example logically divided into first heap and second heap as detailed in page 1, 0012;

' using a mark/allocation bit as an allocation bit to locate a segment of the plurality of segments the segment having a live object' [page 2, col 2, 0021, page 8, col 2, 0085, line 1-11], Kolodner specifically teaches objects are marked or set bit to zero or one depends on the condition using array of bits as detailed in fig 5; and generating allocation bits for the located segment' [page 8, col 2, 0087], Kolodner specifically suggests each object is marked to determine free space, accordingly free space in the run of zero can be determined by looking at the size of the objects as detailed in page 8, 0087.

22. As to claim 10, 28, Kolodner disclosed 'determining whether the allocation bits have been generated for the located segment prior to generating the allocation bits' [page 10, col 1, 0099]; and generating the allocation bits for the located segment if the allocation bits have not been generated [page 10, col 2, 0100]

23. As to claim 11,29, Kolodner disclosed ' determining whether an identification pointer points to a starting address or inside of the live object in the segmentpage 12,

col 1, 0114]; and adding the live object to a root set if the identification pointer points to the starting address of the live object in the segment [page 12, col 2, 0117]..

Claim Rejections - 35 USC § 103

24. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

25. ***Claims 7-8,26, are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuiper, US Patent No. 6324631, published on Nov 27,2001 as applied to claim 1,20 above, further in view of Otis, US Patent No. 6567905 published on May 20,2003.***

26. As to claim 7, 26, Kuiper disclosed 'wherein the performing of the root set enumeration and selective root set enumeration' [col 1, line 62-67, col 2, line 1-2]. It is however, noted that Kuiper does not specifically teach 'enumeration comprises lazy'. On the other hand, Otis disclosed 'enumeration comprises lazy' [col 8, line 18-23].

It would have been obvious to one of the ordinary skill in the art at the time of applicant's invention to incorporate the teachings of Otis into detecting and coalescing

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free areas during garbage collection of Kuiper because both Kuiper, Otis are directed to "garbage collection", more specifically both Kuiper, Otis directed to "mark-sweep" garbage collection [see Kuiper: fig 5A-5B, col 1, line 52-55; Otis: fig 2, element 44, col 7, line 7-8], both Kuiper, Otis specifically suggests mark sweep garbage collection identifies and marks all live objects [Kuiper:col 1, line 62-65, Otis: col 7, line 44-46], and both Kuiper, Otis are from same field of endeavor.

one of the ordinary skill in the art at the time of applicant's invention to incorporate the teachings of Otis into detecting and coalescing free areas during garbage collection of Kuiper because that would have allowed users of Kuiper to use copy-on-red operation particularly during new generation space in other words lazily and selectively copy [see Otis: col 7, line 17-22], further allows to lifetimes of objects in the permanent object memory generation space relate to the overall traffic of objects being "copied" from the persistent object memory rather than conventional garbage collection, thus improving the performance of an application program executing in the virtual machine [col 2, line 30-38].

27. As to claim 8, Otis disclosed 'lazy and selective root set enumeration comprises lazily and selectively identifying the root object in a segment of the heap' [col 6, line 31-39, line 59-64] and regenerating the allocation bits for the root object and other objects associated with the root objects residing in the segment of the heap' [col 7, line 1-6].

Conclusion

The prior art made of record

- a. US Pub.No. . 20020055941
- b. US Patent .No. . 6324631
- c. US Patent .No. . 6567905

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Srirama Channavajjala whose telephone number is 571-272-4108. The examiner can normally be reached on Monday-Friday from 8:00 AM to 5:30 PM Eastern Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alam, Hosain, T, can be reached on (571) 272-3978. The fax phone numbers for the organization where the application or proceeding is assigned is 571-273-8300 Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free)

sc
Patent Examiner.
September 28, 2006


SRIRAMA CHANNAVAJJALA
PRIMARY EXAMINER